

In the Light of Gaza: Ethical Considerations in Genomic Studies of Middle Eastern Populations

Douglas C. Youvan

doug@youvan.com

March 3, 2024

"In the Light of Gaza: Ethical Considerations in Genomic Studies of Middle Eastern Populations" explores the nuanced intersection between cutting-edge genomic research and the ethical considerations it necessitates, particularly in the geopolitically complex and historically rich context of the Middle East. This paper delves into the challenges and responsibilities of conducting genetic studies in a region where historical narratives and contemporary identities are deeply intertwined with ongoing conflicts, such as those witnessed in Gaza. It underscores the importance of approaching scientific inquiry with a heightened sense of ethical awareness, ensuring that research does not inadvertently contribute to the exacerbation of tensions or the perpetuation of historical grievances. By examining specific case studies, including the controversial interpretations of ancient DNA and their implications for modern populations, this paper advocates for a framework of ethical rigor, community engagement, and interdisciplinary collaboration. It aims to contribute to a discourse that respects the dignity of all individuals involved—both ancient and living—and promotes a more informed and empathetic understanding of the complex tapestry of Middle Eastern identities.

Keywords: genomic studies, Middle East, ethical considerations, community engagement, historical narratives, contemporary conflicts, interdisciplinary collaboration, scientific inquiry, dignity, identity.

See: <https://pubmed.ncbi.nlm.nih.gov/32470400/>

Introduction

Overview of "The Genomic History of the Bronze Age Southern Levant"

The study titled "The Genomic History of the Bronze Age Southern Levant" represents a significant scientific endeavor to unravel the complex tapestry of human history using modern genomic tools. Published in the journal *Cell*, the research delves into the genetic makeup of individuals from archaeological sites in the Southern Levant dating back to the Bronze and Iron Ages. The study's findings suggest that the people labeled as "Canaanites" in the archaeological record descended from a blend of local Neolithic ancestry and populations related to the Chalcolithic Zagros and Bronze Age Caucasus regions. Moreover, the study asserts that modern Levantine populations exhibit considerable genetic links to these ancient inhabitants, underscoring a continuity that spans several millennia.

Importance of Ethical Considerations in Genetic Research

The rapid advancements in genetic research have opened new frontiers in understanding human ancestry and migration. However, these developments come with a profound responsibility to navigate the ethical minefield that such potent knowledge presents. Ethical considerations in genetic research are paramount, especially when it intersects with the identities and histories of diverse populations. Issues surrounding consent, the potential stigmatization of communities, the privacy of genetic information, and the interpretation and communication of results demand careful and deliberate attention. The need to respect the dignity of all persons, both past and present, is a fundamental ethical principle that must guide scientific inquiry.

Purpose and Structure of the Critique

The purpose of this critique is to examine "The Genomic History of the Bronze Age Southern Levant" through an ethical lens, scrutinizing the motivations, methodologies, and broader implications of the study. The

critique aims to highlight areas where the research may have fallen short of ethical standards, propose constructive pathways for future research, and foster a dialogue on the responsible conduct of genetic studies concerning human history.

The structure of the critique will follow a logical progression, beginning with a detailed examination of the study's methodology and reported findings. It will then delve into the ethical considerations intrinsic to such research, assessing the potential implications for contemporary populations and the sociopolitical fabric of the region. The critique will conclude with recommendations aimed at bolstering ethical practices in historical genomic research, thus ensuring that the pursuit of knowledge is both scientifically robust and ethically sound.

Contextual Background

Historical and Cultural Significance of the Southern Levant

The Southern Levant is a region of profound historical and cultural importance. It has been a crossroads for commerce, culture, and religion for millennia, serving as the backdrop for numerous pivotal historical events. This area, encompassing modern-day Israel, Palestine, Jordan, and surrounding territories, is rich in archaeological sites that reveal the tapestry of human civilization from the earliest city-states through various empires to the present day. It is the cradle of the Abrahamic religions and a mosaic of diverse cultures. The Canaanites, one of the ancient peoples who inhabited this area, are often mentioned in the context of biblical narratives and have left a significant archaeological footprint. Their legacy is deeply interwoven with the identity and cultural heritage of the region, making the study of their origins and genetic history particularly sensitive.

Current Sociopolitical Climate in the Region

The modern sociopolitical climate of the Southern Levant is complex and often volatile. Long-standing conflicts, deeply rooted in historical claims and religious significance, continue to affect the lives of people in the region. Issues of nationhood, territorial disputes, and the right of return for diasporic populations remain contentious and are frequently debated on the international stage. The memory and interpretation of history play a significant role in the politics of identity and legitimacy in this part of the world. Consequently, any research pertaining to the genetic history of the region's inhabitants is potentially inflammatory if not handled with utmost care and sensitivity to the contemporary sociopolitical nuances.

The Role of Genetics in Understanding Human History

Genetics has become an indispensable tool for unraveling human history. By analyzing DNA from ancient remains, scientists can trace migration patterns, understand the intermingling of populations, and reconstruct the lineage of modern-day individuals. This genomic insight offers a new dimension to our understanding of history, complementing the traditional archaeological and historical records. However, the interpretation of genetic data is not straightforward and is fraught with challenges. The narratives constructed from genetic studies can influence contemporary understandings of identity and heritage. Therefore, the role of genetics in historical interpretation must be approached with a critical eye, ensuring that scientific insights do not overwrite the rich tapestry of history with a simplistic or reductionist narrative. This is particularly salient in regions like the Southern Levant, where history is not merely academic but a living, breathing element of everyday life and politics.

Noah and the Canaanites

In the Hebrew Bible, Noah is a pivotal figure in the narrative leading up to and following the Great Flood. Noah is described as a righteous man, blameless among the people of his time, and he is chosen by God to build an ark to save his family and a pair of each animal species from the flood sent to cleanse the earth of its wickedness. Noah had three sons: Shem, Ham, and Japheth, who are considered the ancestors of all post-flood humanity.

The story of Noah's grandson Canaan begins with a troubling episode involving Noah and his son Ham. After the flood, Noah became intoxicated, and Ham saw his father's nakedness and told his two brothers. Shem and Japheth, however, respectfully covered their father without looking at him. When Noah awoke and learned what had happened, he cursed Ham's son Canaan, saying he would be a servant to his brothers. This curse is notable because it was directed at Canaan rather than Ham himself.

Canaan is traditionally seen as the progenitor of the Canaanite people, who lived in the region later known as the Southern Levant. This land was rich in history and culture and played a significant role in the ancient Near East.

Moloch, as mentioned earlier, is a deity associated with child sacrifice in the Hebrew Bible, mainly in the books of Leviticus, Kings, and Jeremiah. The biblical texts condemn the worship of Moloch and the associated practice of child sacrifice, which was reportedly part of the religious customs of some Canaanite cultures. The practice is depicted as one of the reasons for the divine punishment and disfavor upon the Canaanites and other neighboring peoples who engaged in such rituals.

The connection between Canaan and Moloch in the biblical narrative is not direct; Canaan is not mentioned in conjunction with Moloch or child sacrifice. However, as the purported ancestor of the Canaanites, Canaan's name is often associated with the region and, by extension, the cultural practices of his descendants as described in the Bible. It's important to note

that the historical accuracy of these practices and their prevalence among the ancient Canaanites has been the subject of much scholarly debate, with some archaeologists and historians questioning the extent to which child sacrifice was a central or widespread part of Canaanite religion.

In this light, any contemporary genetic research that references the Canaanites, such as the study "The Genomic History of the Bronze Age Southern Levant," steps into a complex and sensitive historical and religious narrative. It's crucial that such studies are framed and communicated with an understanding of these contexts to avoid perpetuating misconceptions or inflaming modern tensions that may have roots in ancient histories and religious texts.

Ethical Considerations in Genetic Research

Consent and Autonomy in Historical DNA Analysis

The issue of consent in historical DNA analysis is complex due to the fact that the subjects are long deceased and cannot provide consent themselves. However, this does not absolve researchers from the responsibility of considering the implications of their work on the descendants of these subjects. Ethical research in this field should involve:

1. Engaging with living communities closely related to the subjects of the study.
2. Seeking permissions from custodians of the remains, such as museums or archaeological sites.
3. Contemplating the broader impact of the research on communities who may hold a cultural or religious connection to the ancient DNA being studied.

Autonomy, in the context of historical DNA, extends to the cultural and communal autonomy of descendant populations, who may have their own perspectives on the research and its outcomes. Researchers should strive to

respect these perspectives and avoid any actions that could inadvertently strip these communities of their autonomy over their cultural and historical narratives.

Communication and Interpretation of Research Findings

The communication of genetic research findings is a critical step that must be handled with great care to ensure accuracy and prevent misrepresentation. Ethical considerations include:

1. Avoiding sensationalism and being mindful of the language used to describe findings, particularly when they relate to contentious historical periods or events.
2. Being transparent about the limitations of the research, making it clear that genetic data provide only one view of the complex tapestry of human history.
3. Ensuring that interpretations do not overstep scientific evidence and that they acknowledge the multi-faceted nature of identity, which encompasses more than just genetics.

Scholars should also be wary of reductionist narratives that may emerge from their findings, and they should work to contextualize their research within the broader scope of human history and culture.

Potential for Misuse in Politically Sensitive Contexts

Genetic studies have the potential to be misused, particularly in regions where identity, ancestry, and land rights are hotly contested, as is the case in the Middle East. Ethical research must therefore:

1. Consider the current political climate and the historical sensitivities of the region when conducting and publishing research.
2. Anticipate and address potential misinterpretations that could fuel ethnic or nationalistic claims.

3. Engage with a wide array of scholars, including historians, anthropologists, and ethicists, to provide a balanced interpretation of the data.

Researchers have a responsibility to conduct their work in a way that does not exacerbate existing conflicts or create new ones. It is imperative to recognize the power of genetic research to influence contemporary narratives and to handle that power with the utmost ethical consideration.

Ethical Considerations in Genetic Research

Consent and Autonomy in Historical DNA Analysis

The unique challenge in historical DNA analysis lies in the impossibility of obtaining consent from individuals who lived in the past. This raises significant ethical concerns regarding the autonomy of these individuals and their descendants. Researchers must navigate these complexities by:

1. **Engaging with Descendant Communities:** Whenever possible, researchers should engage with contemporary communities that may be genetically or culturally connected to the ancient samples. This engagement respects the principle of autonomy by involving those who might consider the ancient individuals as their ancestors in the decision-making process.
2. **Ethical Oversight:** Projects should be reviewed by ethics committees that consider the implications of the research on descendant communities and the treatment of human remains. This oversight helps ensure that the research respects the dignity and autonomy of the individuals under study.
3. **Cultural Sensitivity:** Researchers must be culturally sensitive and acknowledge the beliefs, traditions, and perspectives of communities connected to the research subjects. This includes respecting burial sites and considering the cultural significance of genetic information.

Communication and Interpretation of Research Findings

Effective and ethical communication is paramount in genetic research to ensure that findings are accurately represented and understood:

1. **Clear Communication:** Researchers must clearly communicate their findings and the limitations of their research, avoiding sensationalism and ensuring that the media and public do not misinterpret their work.
2. **Contextualization:** It's crucial to contextualize genetic findings within the broader historical and cultural narratives. Genetics can tell part of human history but not its entirety. Acknowledging the multifaceted nature of human history helps prevent reductionist interpretations.
3. **Collaboration with Other Disciplines:** By working with historians, archaeologists, anthropologists, and ethicists, geneticists can ensure that their findings are integrated into a broader understanding of the past, avoiding overly deterministic or simplistic conclusions.

Potential for Misuse in Politically Sensitive Contexts

In regions where historical narratives are deeply intertwined with current political and social issues, the misuse of genetic research findings can have serious repercussions:

1. **Awareness of Sociopolitical Contexts:** Researchers must be acutely aware of the sociopolitical contexts of the regions they study and consider how their findings might be interpreted or misused within those contexts. This awareness can guide the framing and dissemination of research results.
2. **Preventing Misuse:** Proactively addressing how findings might be misused for nationalistic, ethnic, or political purposes is a crucial ethical responsibility. This includes being cautious about making or supporting claims related to contemporary identities or territorial claims based on ancient genetic data.

3. **Engagement and Dialogue:** Continuous engagement and dialogue with affected communities, policymakers, and the public can help mitigate the risks of misuse. This engagement should aim to educate about the scientific process, the limitations of genetic data, and the complexity of human identities.

In summary, ethical considerations in genetic research, especially concerning historical DNA analysis, require a multifaceted approach that respects the dignity of past individuals and the rights and sensibilities of present-day communities. It necessitates clear communication, cultural sensitivity, and an awareness of the broader implications of the research within current sociopolitical landscapes.

Critique of Methodology and Motivation

Transparency of Research Objectives and Funding Sources

Transparency in the objectives and funding sources of genetic research is crucial to understanding the context and potential biases that might influence a study. This transparency helps in assessing the integrity of the research and ensuring that it serves the broader interest of advancing knowledge rather than specific agendas.

1. **Clarity of Objectives:** The goals of the study should be clearly stated, including both the scientific aims and any broader impacts the research might seek to address. This clarity helps to align the expectations of the scientific community and the general public.
2. **Disclosure of Funding Sources:** Understanding who finances the research is essential for identifying potential conflicts of interest. Funding from sources with specific political, ideological, or commercial interests could influence the research focus, methodology, and interpretation of results. Complete disclosure

allows for a more informed critique of the research's motivations and potential biases.

The Selection of Samples and Representation of Populations

The selection of archaeological samples and the populations they are intended to represent is a critical aspect of genetic research methodology. This selection process can significantly impact the study's conclusions and its applicability to broader historical narratives.

1. **Diversity and Representation:** Ensuring that the samples selected for study represent the diversity within the population of interest is crucial for avoiding skewed or incomplete interpretations. The failure to account for the full spectrum of genetic diversity can lead to oversimplified or incorrect conclusions about population history and dynamics.
2. **Contextualization of Samples:** The archaeological and historical context of the samples must be thoroughly understood and communicated. This includes the geographical, temporal, and cultural background of the samples, which are essential for accurately interpreting genetic data in its historical context.

Potential Biases in Data Interpretation and Publication

The interpretation of genetic data and the decision of what findings to publish can introduce biases that affect the integrity and impact of the research.

1. **Interpretative Biases:** Researchers bring their own perspectives to the analysis and interpretation of data, which can lead to conscious or unconscious biases. These biases can shape how data are understood and reported, potentially leading to conclusions that reflect the researchers' preconceptions more than the data itself.
2. **Publication Bias:** The tendency to publish positive or confirmatory results over negative or inconclusive ones can skew the scientific

literature and public understanding of a topic. In the context of genetic research on human history, this bias might amplify certain narratives while minimizing or ignoring others, contributing to a distorted view of the past.

3. **Peer Review and Critique:** The peer review process is intended to mitigate biases by subjecting research to the scrutiny of experts in the field. However, the effectiveness of peer review can vary, and it may not always catch methodological flaws or biases. Open critique and discussion within the scientific community, as well as engagement with scholars from related disciplines, are essential for a comprehensive understanding of the research's implications.

In summary, a critical examination of the methodology and motivation behind genetic research requires a careful consideration of transparency, sample selection, and potential biases. Addressing these aspects is crucial for ensuring that such research contributes constructively to our understanding of human history and respects ethical standards.

Impact and Implications

Influence on Public and Academic Discourse

The findings from genetic studies like "The Genomic History of the Bronze Age Southern Levant" can have a profound impact on both public and academic discourse. In academia, such research can shift prevailing theories about human migration, ancestry, and the interconnections between different populations. These shifts can lead to new research directions, interdisciplinary collaborations, and a deeper understanding of human history. However, the complexity of genetic data and its interpretation can also lead to debates and disagreements within the scholarly community about the implications of these findings.

In the public sphere, these studies often capture the imagination of people interested in history, ancestry, and identity. However, without proper context and explanation, the findings can be oversimplified or misinterpreted, leading to misconceptions about historical relationships between populations. Media coverage may further amplify these issues, emphasizing sensational aspects of the research without adequately addressing its limitations and nuances.

Potential Effects on Regional Politics and Identity

In regions like the Middle East, where historical narratives are deeply intertwined with contemporary politics and identities, genetic research can have significant implications. Studies examining the genetic makeup of ancient populations can become entangled with issues of national identity, territorial claims, and cultural heritage. For instance, findings that highlight the continuity or discontinuity between ancient populations and present-day communities can be seized upon by various groups to support political agendas or claims to land and resources.

Such research can also influence how communities perceive their own identities and their relationships with neighboring groups. While it has the potential to foster a sense of shared heritage and mutual respect, it can also exacerbate divisions if interpreted through the lens of contemporary conflicts and prejudices.

Long-term Consequences for Affected Communities

The long-term consequences of genetic research on human history for affected communities can be profound and varied. On a positive note, such studies can contribute to a greater sense of identity and belonging, providing communities with a deeper understanding of their historical roots and the migrations and interactions that shaped their ancestors. This knowledge can enrich cultural practices and strengthen connections to the past.

However, there are also potential negative consequences, particularly if the research is perceived as undermining the historical narratives that are central to a community's identity or if it is used to justify discrimination or exclusion. Furthermore, the commercialization of genetic ancestry testing can lead to oversimplified views of identity that neglect the complex web of cultural, historical, and social factors that shape individual and collective identities.

In conclusion, while genetic research on ancient populations can offer valuable insights into human history, it must be conducted and communicated with sensitivity to its potential impacts on public understanding, academic discourse, and the politics and identities of contemporary communities. Ethical considerations, careful interpretation, and open dialogue are essential to navigate the complexities of how such research influences both the present and the future.

Recommendations for Ethical Research

Developing Guidelines for Sensitive Historical DNA Studies

Creating and adhering to ethical guidelines tailored for historical DNA studies is essential for navigating the complex terrain of ancient genetic research. These guidelines should address the unique challenges posed by working with ancient human remains and the potential impacts on present communities.

1. **Inclusive Framework:** Guidelines should be developed through a consultative process involving ethicists, scientists, historians, archaeologists, and representatives of descendant communities. This inclusivity ensures a broad perspective on the ethical issues at stake.
2. **Consent and Ancestral Respect:** Establish protocols for obtaining consent that, while acknowledging the impossibility of direct consent from ancient individuals, respect the interests and sensitivities of

descendant and related communities. Guidelines should also cover the respectful handling of human remains and the cultural and spiritual practices associated with them.

3. **Transparency and Accountability:** Mandate transparency in research goals, methodologies, funding sources, and potential conflicts of interest. This openness supports accountability to both the scientific community and the public.

Encouraging Interdisciplinary Approaches and Collaboration

The complexities of historical DNA research require insights from multiple disciplines to ensure accurate, nuanced interpretations of the data.

1. **Interdisciplinary Research Teams:** Build research teams that include geneticists, archaeologists, historians, anthropologists, and other relevant experts. This diversity encourages a holistic approach to research questions and interpretations.
2. **Cross-Disciplinary Education:** Promote educational opportunities that equip researchers with a broad understanding of the fields adjacent to their own. Understanding the methods, challenges, and perspectives of other disciplines enriches the research process and fosters collaboration.
3. **Joint Publications and Projects:** Encourage the publication of joint research findings and the undertaking of projects that require interdisciplinary collaboration. These efforts can bridge gaps between disciplines, leading to more comprehensive and insightful research outcomes.

Prioritizing Engagement with Local Communities

Engaging with communities connected to the research subjects respects their autonomy and acknowledges their stake in the research outcomes.

1. **Community Consultation:** Engage with local and descendant communities at all stages of the research process, from planning to

publication. This consultation should seek their input, address their concerns, and inform them of the findings and their implications.

2. **Benefit Sharing:** Consider ways in which the research can benefit the communities involved, whether through enhancing cultural understanding, supporting heritage projects, or other means. Research should not be extractive but should aim to give back to those who have a direct connection to the subjects of study.
3. **Public Education and Outreach:** Develop programs that communicate the research findings to the broader public, including the communities connected to the study, in an accessible and respectful manner. Outreach should aim to educate about the scientific process and the study's contributions to our understanding of human history.

Implementing these recommendations can help ensure that historical DNA research is conducted ethically, with respect for the individuals studied, their descendants, and the wider community. Ethical research practices contribute to the advancement of knowledge while maintaining public trust and respecting the dignity of all involved.

Conclusion

Summary of Ethical Issues Identified

The critique of "The Genomic History of the Bronze Age Southern Levant" and similar studies in the realm of historical DNA research illuminates several ethical considerations. These include the necessity for transparency in research objectives and funding, the careful selection and representation of samples, and the potential for biases in data interpretation and publication. Moreover, the potential for research findings to influence public and academic discourse, affect regional politics and identity, and have long-term consequences for affected communities underscores the importance of ethical vigilance. The ethical landscape of historical DNA

research is complex, intertwining respect for ancient individuals and their descendants with the pursuit of scientific knowledge.

Call for Action within the Scientific Community

This analysis serves as a call to action for the scientific community to prioritize ethical considerations in historical DNA research. Researchers, funding bodies, and academic journals should work together to develop and enforce guidelines that ensure ethical standards are upheld. This includes fostering interdisciplinary collaboration, engaging with local communities, and promoting transparency and accountability in research practices. The scientific community must also remain alert to the broader implications of their work, striving to prevent misuse and misinterpretation that could exacerbate tensions in sensitive sociopolitical contexts.

Final Thoughts on the Balance between Scientific Inquiry and Ethical Responsibility

The pursuit of knowledge through scientific inquiry is a noble endeavor, but it must be balanced with a deep ethical responsibility to both the past and the present. The study of ancient DNA offers unparalleled insights into human history, yet it treads on sacred ground, invoking the lives and legacies of those who came before us. As we move forward, the scientific community must navigate this terrain with a profound respect for the individuals and communities involved, ensuring that our quest for understanding never comes at the expense of ethical principles. By embracing a framework that prioritizes ethics alongside scientific rigor, we can honor our collective past while fostering a more informed and respectful discourse about our shared human heritage.

Epilogue: In the Light of Gaza: The Genetics of Moloch

In the shadow of contemporary conflicts, the title "In the Light of Gaza: The Genetics of Moloch" carries with it a weight of irony and sorrow. It reflects a poignant juxtaposition—the ancient narratives of child sacrifices to Moloch against the backdrop of modern-day sufferings in Gaza, where children are among those who bear the brunt of ongoing geopolitical strife. This epilogue seeks not to draw direct parallels but to illuminate the complex interplay between historical narratives and present realities, and how the pursuit of scientific understanding intersects with the profound ethical considerations these situations demand.

The ancient deity Moloch, associated with the sacrifice of children in the fires of religious fervor, stands as a symbol of humanity's capacity for inflicting suffering in the name of belief or, more broadly, ideology. Fast forward to today, the children of Gaza find themselves in the midst of a conflict they neither chose nor comprehend, their lives overshadowed by a war that, in many ways, represents a modern form of sacrifice at the altar of political and religious ideologies.

The exploration of genetic histories in regions like the Southern Levant, while scientifically enriching, steps into a landscape charged with contemporary significance. It reminds us that the past is not merely a collection of data points to be analyzed but a narrative intertwined with the identities, memories, and traumas of living communities. The irony of discussing ancient sacrifices in a land where the echoes of loss and sacrifice are a present reality serves as a stark reminder of the ethical responsibilities that accompany the quest for knowledge.

This epilogue, therefore, calls for a reflection on the broader implications of our scientific endeavors. It urges us to consider how the stories we tell through our research, the histories we uncover, and the names we invoke—like Moloch—resonate in a world still grappling with the very real sacrifices made in the name of various ideologies. It is a call to approach our work with a profound sense of humility and empathy, recognizing the

reverberations of the past in the present and acknowledging the shared humanity that binds us across time.

"In the Light of Gaza: The Genetics of Moloch" is not just a reflection on the ethical dimensions of genetic research; it is a reminder of the ongoing need for compassion, understanding, and peace in addressing the wounds of both history and the present. As we delve into the genetic tapestry of the ancient world, let us not lose sight of the moral and ethical tapestries that define our humanity today. May our scientific pursuits be guided by an unwavering commitment to ethics, empathy, and the pursuit of peace, recognizing that every child's life is precious, and no ideological cause justifies their sacrifice.

The Genomic History of the Bronze Age Southern Levant

Lily Agranat-Tamir¹, Shamam Waldman², Mario A S Martin³, David Gokhman⁴, Nadav Mishol⁴, Tzila Eshel⁵, Olivia Cheronet⁶, Nadin Rohland⁷, Swapan Mallick⁸, Nicole Adamski⁹, Ann Marie Lawson⁹, Matthew Mah¹⁰, Megan Michel⁹, Jonas Oppenheimer⁹, Kristin Stewardson⁹, Francesca Candilio¹¹, Denise Keating¹², Beatriz Gamarra¹³, Shay Tzur², Mario Novak¹⁴, Rachel Kalisher¹⁵, Shlomit Bechar¹⁶, Vered Eshed¹⁷, Douglas J Kennett¹⁸, Marina Faerman¹⁹, Naama Yahalom-Mack¹⁶, Janet M Monge²⁰, Yehuda Govrin²¹, Yigal Erel⁵, Benjamin Yakir²², Ron Pinhasi²³, Shai Carmi²⁴, Israel Finkelstein²⁵, Liran Carmel²⁶, David Reich²⁷

Affiliations — collapse

Affiliations

- 1 Department of Genetics, The Alexander Silberman Institute of Life Sciences, Faculty of Science, The Hebrew University of Jerusalem, Edmond J. Safra Campus, Givat Ram, Jerusalem 9190401, Israel; Department of Statistics, The Hebrew University of Jerusalem, Jerusalem 9190501, Israel.
- 2 Braun School of Public Health and Community Medicine, The Hebrew University of Jerusalem, Jerusalem, Israel.
- 3 Institute of Archaeology, Tel Aviv University, Tel Aviv 6997801, Israel.
- 4 Department of Genetics, The Alexander Silberman Institute of Life Sciences, Faculty of Science, The Hebrew University of Jerusalem, Edmond J. Safra Campus, Givat Ram, Jerusalem 9190401, Israel.
- 5 The Fredy and Nadine Herrmann Institute of Earth Sciences, the Hebrew University of Jerusalem, Edmond J. Safra Campus, Givat Ram, Jerusalem 9190401, Israel.
- 6 Department of Evolutionary Anthropology, University of Vienna, Vienna, Austria.
- 7 Department of Genetics, Harvard Medical School, Boston, MA 02115, USA; Broad Institute, Cambridge, MA 02138, USA.
- 8 Department of Genetics, Harvard Medical School, Boston, MA 02115, USA; Broad Institute, Cambridge, MA 02138, USA; Howard Hughes Medical Institute, Harvard Medical School, Boston, MA 02115, USA; Department of Human Evolutionary Biology, Harvard University, Cambridge, MA 02138, USA.
- 9 Department of Genetics, Harvard Medical School, Boston, MA 02115, USA; Howard Hughes Medical Institute, Harvard Medical School, Boston, MA 02115, USA.
- 10 Department of Genetics, Harvard Medical School, Boston, MA 02115, USA; Broad Institute, Cambridge, MA 02138, USA; Howard Hughes Medical Institute, Harvard Medical School, Boston, MA 02115, USA.